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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

09/803,715

03/09/2001

Jia Li

91-C-127C1  
(STM101-00022)

1849

30425 7590 06/04/2003

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EXAMINER

DANG, TRUNG Q

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/803,715

Applicant(s)

LI, JIA

Examiner

Trung Q. Dang

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on amendment C filed 3/24/03.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 32-47 is/are pending in the application.
- 4a) Of the above claim(s) 46 and 47 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 32-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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1. Applicant's election of claims 1 and 32-47 in Paper No. 10 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 32-33, 35, 38-40, 42, and 45 are rejected under 35 U.S.C. 102(b) as being anticipated by Harper (EPO- 0123384, reference AB cited in the IDS)

The reference teaches the claimed invention in that it discloses a LOCOS process which comprises the steps of: forming an n-type region 22 and p-type region 27 within a substrate (Fig. 3 and page 10, lines 29-32 where the use of a p type substrate and associated n-type well is included with the teaching of the reference); forming a nitride layer 30 (oxidation barrier layer) over the n-type and p-type regions; forming a first patterned layer 32 which exposes first isolation areas in n-type region and which cover substantially all of the p-type region and active device areas in the n-type region (Fig. 5 and related text); removing portions of the nitride layer 30 to expose the first isolation areas; implanting a first channel stop dopant into the first isolation areas (Fig. 6 and related text); removing the first patterned layer 32; forming a second patterned layer

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40 which exposes second isolation areas in p-type region and which cover substantially all of the n-type region and active device areas in the p-type region; removing portions of the nitride layer 30 to expose the second isolation areas; implanting a second channel stop dopant into the second isolation areas (Fig. 8 and related text); removing the second patterned layer; and growing a field oxide on the first and second isolation areas where exposed by the nitride layer 30 in a single oxidation step (Fig. 10 and Fig. 15). Note that since the claims employ “comprising” format which do not exclude additional oxidation steps, the multi-step oxidation of the reference is readable on the claims.

As for claims 35 and 42, see line 34 of page 14 to line 35 of page 15 for the teaching that dimension of the N field mask and dimension of the P field mask are selected independently according to the formulas recited at line 39 of page 14 and line 9 of page 15. Since the dimensions of the N field mask and P field mask are related to the dimension of the active areas in the p-type region and n-type region, this teaching reads on the limitation of claims 35 and 42.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 34 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harper as above and further in view of Hosaka (JP 63-271956, reference AE cited in the IDS).

Harper teaches a LOCOS process as noted above. Harper differs from the claims in teaching the use of oxide/nitride as an oxidation mask rather than oxide/polysilicon/nitride as claimed. However, Hosaka teaches a LOCOS process in which a mask of oxide/polysilicon/nitride is used as an oxidation mask. Since the difference in thermal expansion coefficient of polysilicon and the silicon substrate is similar, the use of polysilicon as a main material of the oxidation mask has the benefit of preventing defects generated in the substrate due to the stress exerted by the nitride during oxidation (see Abstract and bottom of page 11 to page 12). Thus, it would have been obvious to one of ordinary skill in the art to modify the Harper's's teaching by employing the oxidation mask of oxide/polysilicon/nitride as suggested by Hosaka because of the advantage mentioned above. The defects free of the active area would be desirable for the construction of reliable devices.

4. Claims 36-37 and 43-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harper as above and further in view Wolf (reference AK cited in the IDS).

Harper teaches a LOCOS process as noted above except for the etching of recess into the substrate. Wolf in page 39-40 teaches fully recessed oxide LOCOS wherein a recess is formed in the substrate before oxidation (Fig.2-26). It would have been obvious to one of ordinary skill in the art to modify the conventional LOCOS process of Harper by employing the fully recessed

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LOCOS as suggested by Wolf because the isolation structure obtained by the fully recessed LOCOS not only reducing bird's beak encroachment but also resulting in a planar surface topography (last paragraph of page 40). Reduction in bird's beak encroachment provides more active areas for manufacturing electronic devices, and the planar surface topography reduces wiring breakage when interconnect wiring are run over the isolation region. Such advantages are desirable in the manufacture of integrated circuit.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trung Dang whose telephone number is (703) 308-2548. The examiner can normally be reached on weekdays from 9:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794. The fax phone number for this Group is (703) 305-3432 or (703) 308-7725.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

A handwritten signature in black ink, appearing to read 'Trung Dang', with a stylized, cursive script.

Trung Dang

Primary Examiner, Group 2800